2008

Research Update Meeting 2008 - Cranberry Physiology Research Agenda

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Cranberry Physiology Research Agenda

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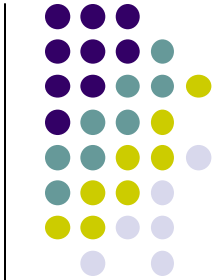
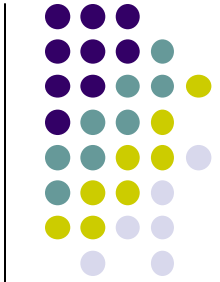
Agenda



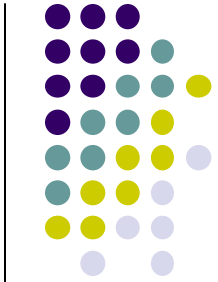
1. Irrigation water management
2. Temperature effect on antioxidant content
3. Monitoring pollen viability
4. Salt or dodder stress on chlorophyll & photosynthesis
5. Monitoring the yellow vine syndrome

Irrigation Water Management



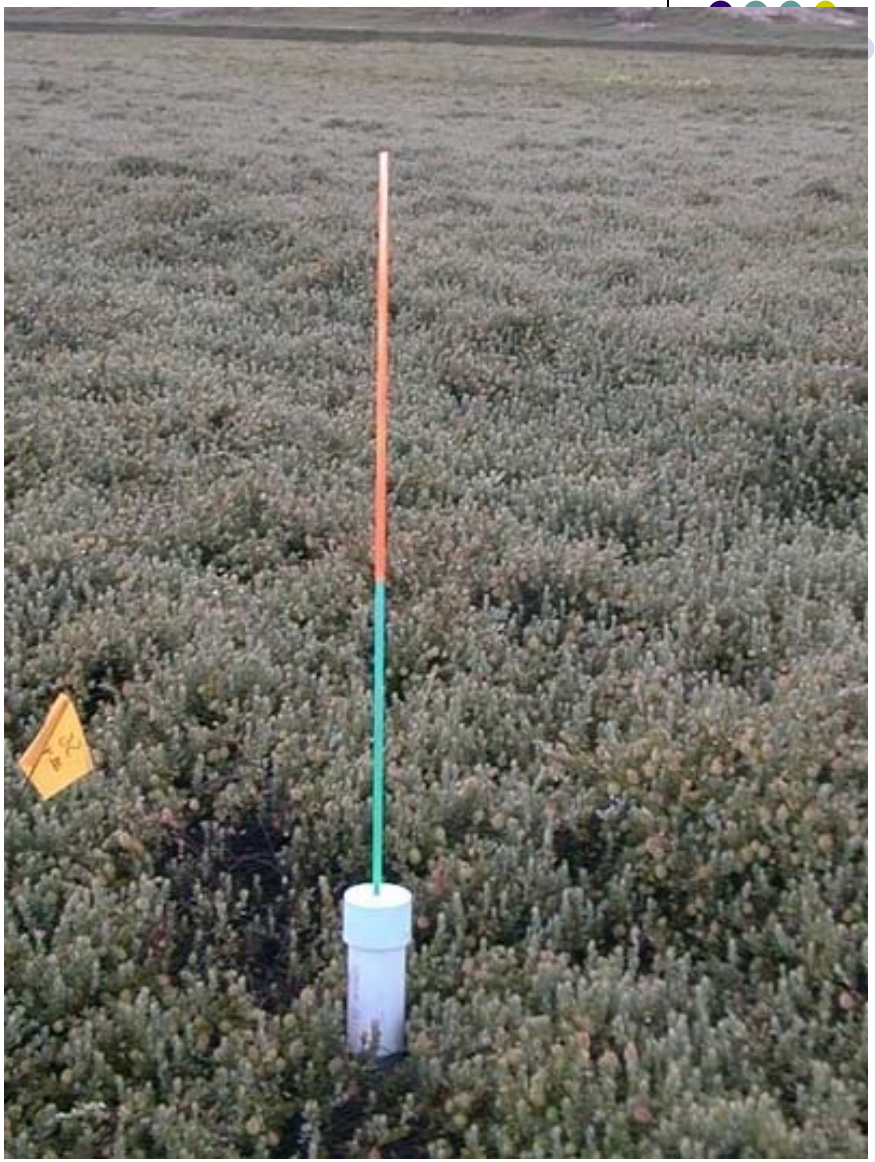
1. Better manage water resources
   - ✓ limit waste
   - ✓ reduce costs
   - ✓ increase yield & maximize profits
2. Reduce risk of leaching chemicals to unintended targets
3. Increase use of technology- save energy & reduce labor demands

How much water is too much?



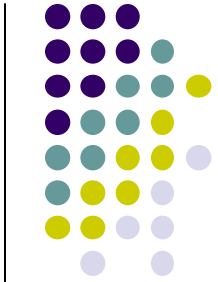
- We don’t know
- Lack of scientific data on moisture levels optimum for local conditions
- Variations from bog to bog, soil types, cultivar grown
- Bruce Lampinen – water level float
- Evaporative demand study
- Beds wetter than required
- Cranberry might need less than 1-inch/week

Too wet



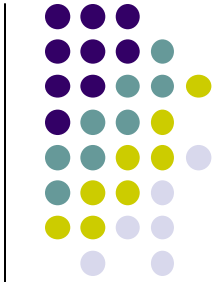
Adequate range

Irrigation Management Tools



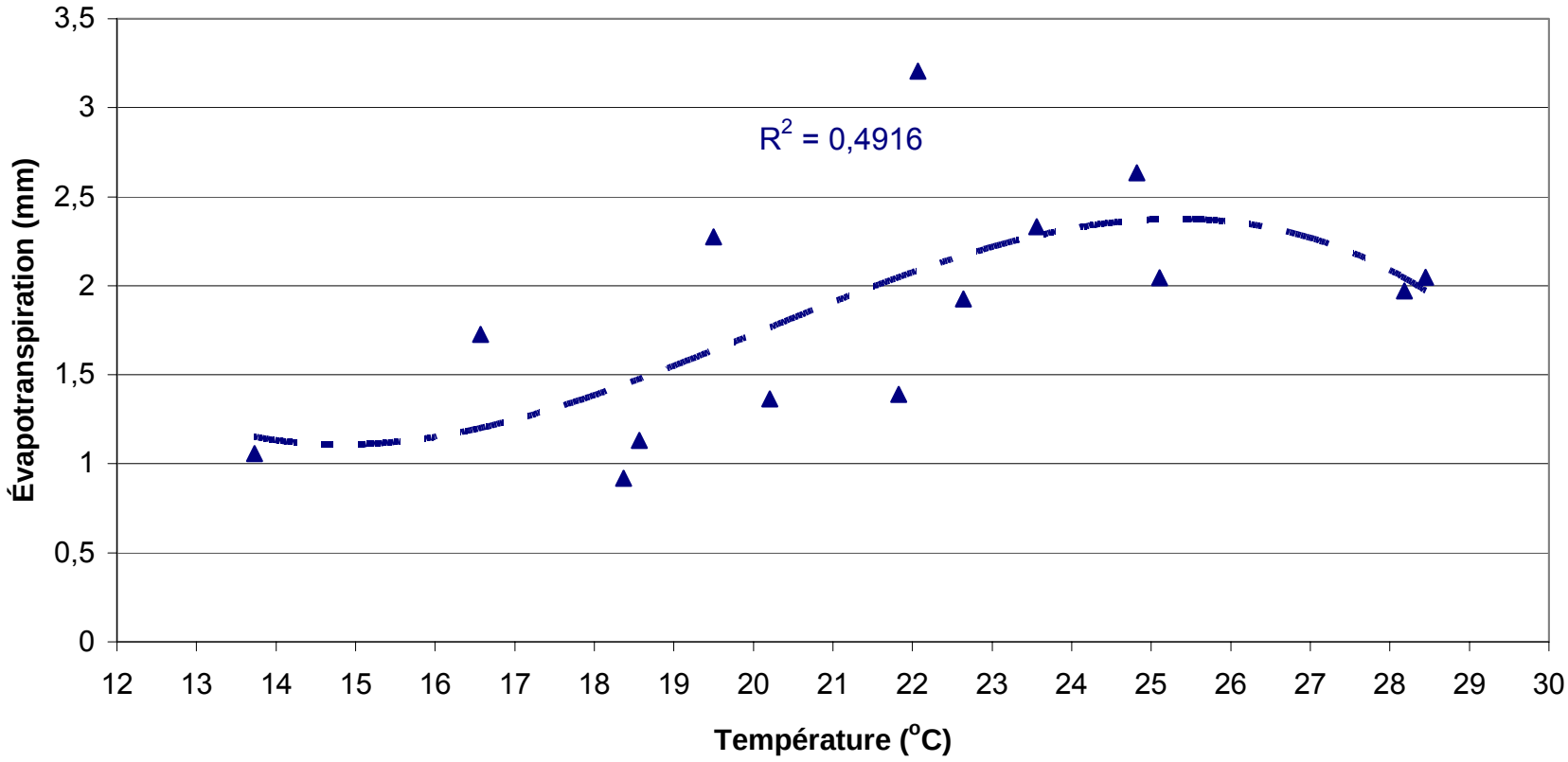
Measurement type	Plant	Atmosphere	Soil
Direct	Photosynthesis		Tension
	Transpiration		
	Xylem potential		
Indirect	Leaf temperature	Evapotranspirative demand	Water content
	Flourescence		

Cranberry Irrigation Sensors



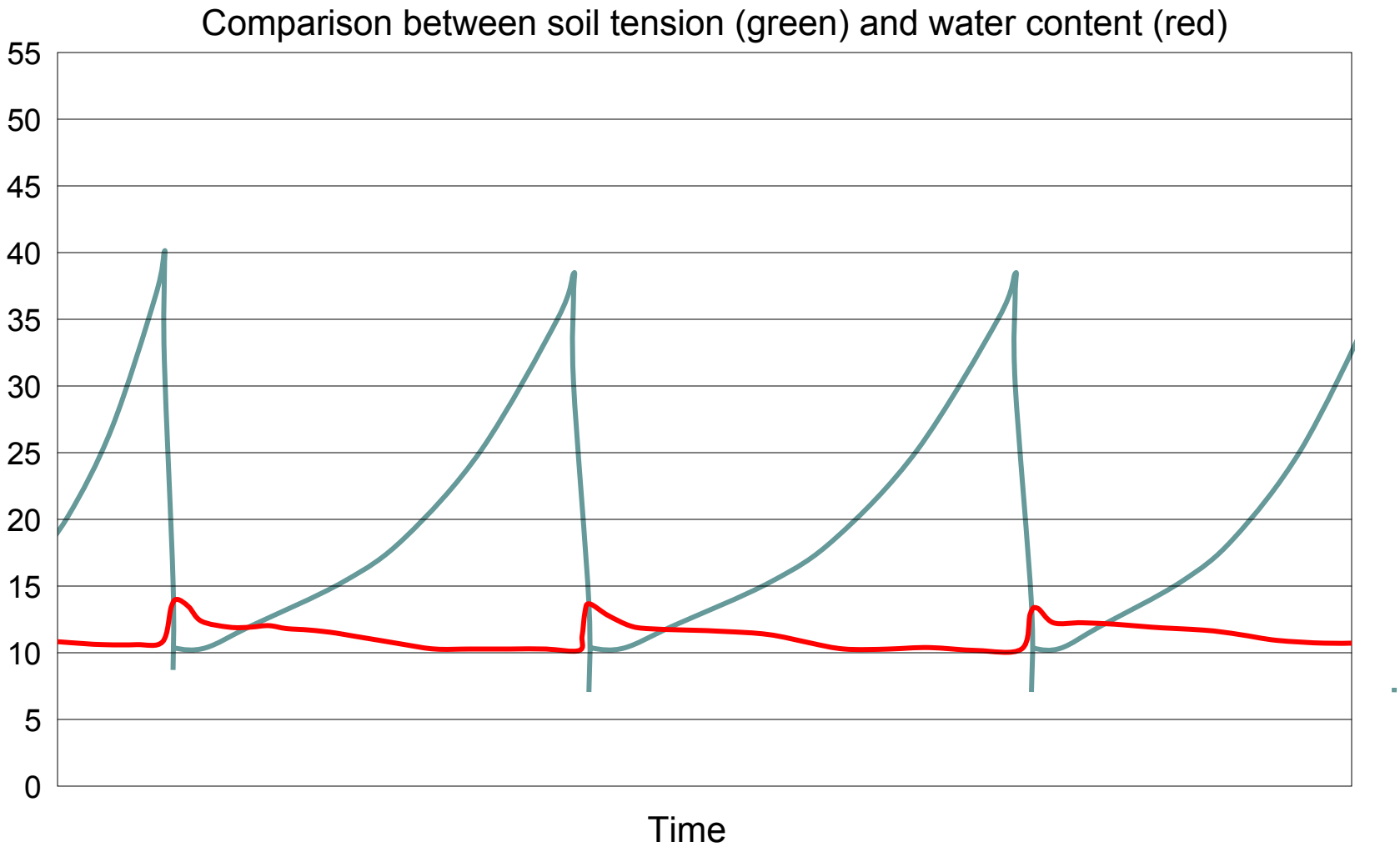
- Ability to detect when crop is under stress
- Determine severity of stress
- Using IRt/c (model IRt/c-K-0F/27C, Exergen Corp)
- What is the critical temperature in cranberry?
- Tc is responsive to physiological & environmental stimuli

Evapotranspiration of cranberry at different temperatures



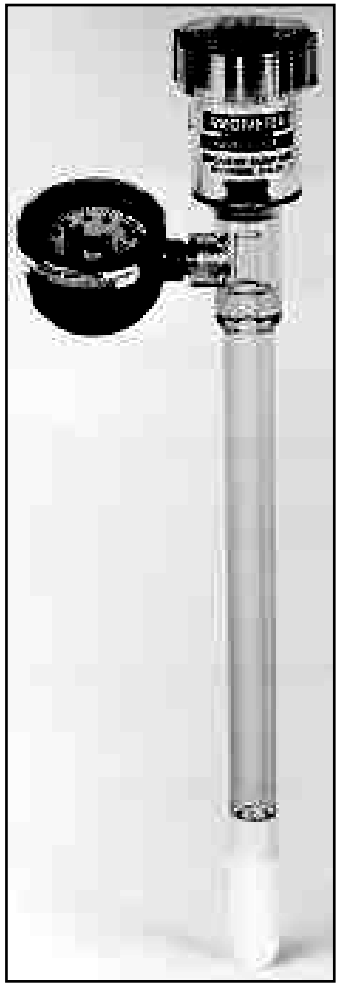
Source: Jean Caron, U of Laval

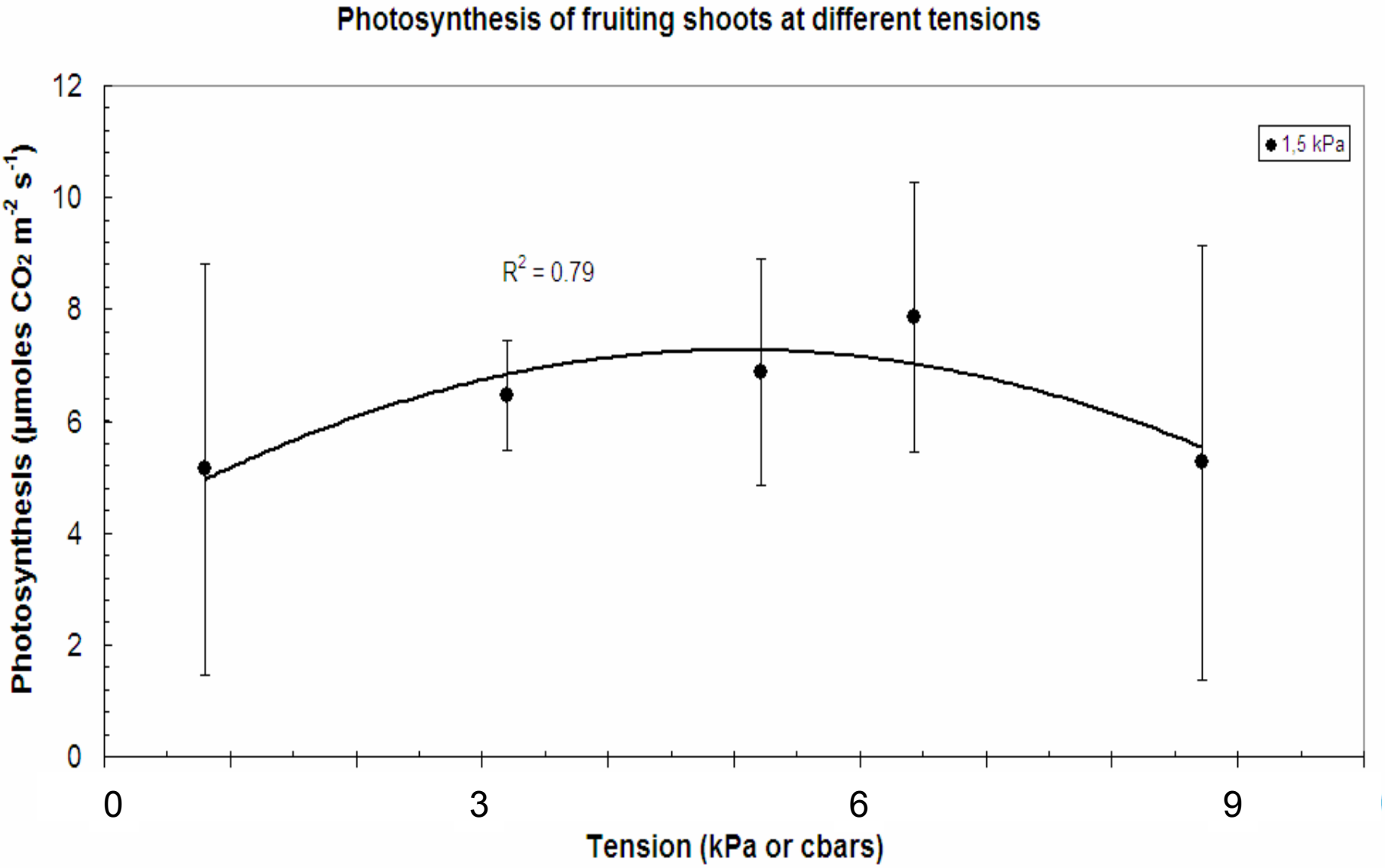
Measuring Soil Tension and water content (Madramottoo, 2007, courtesy of McGill university)



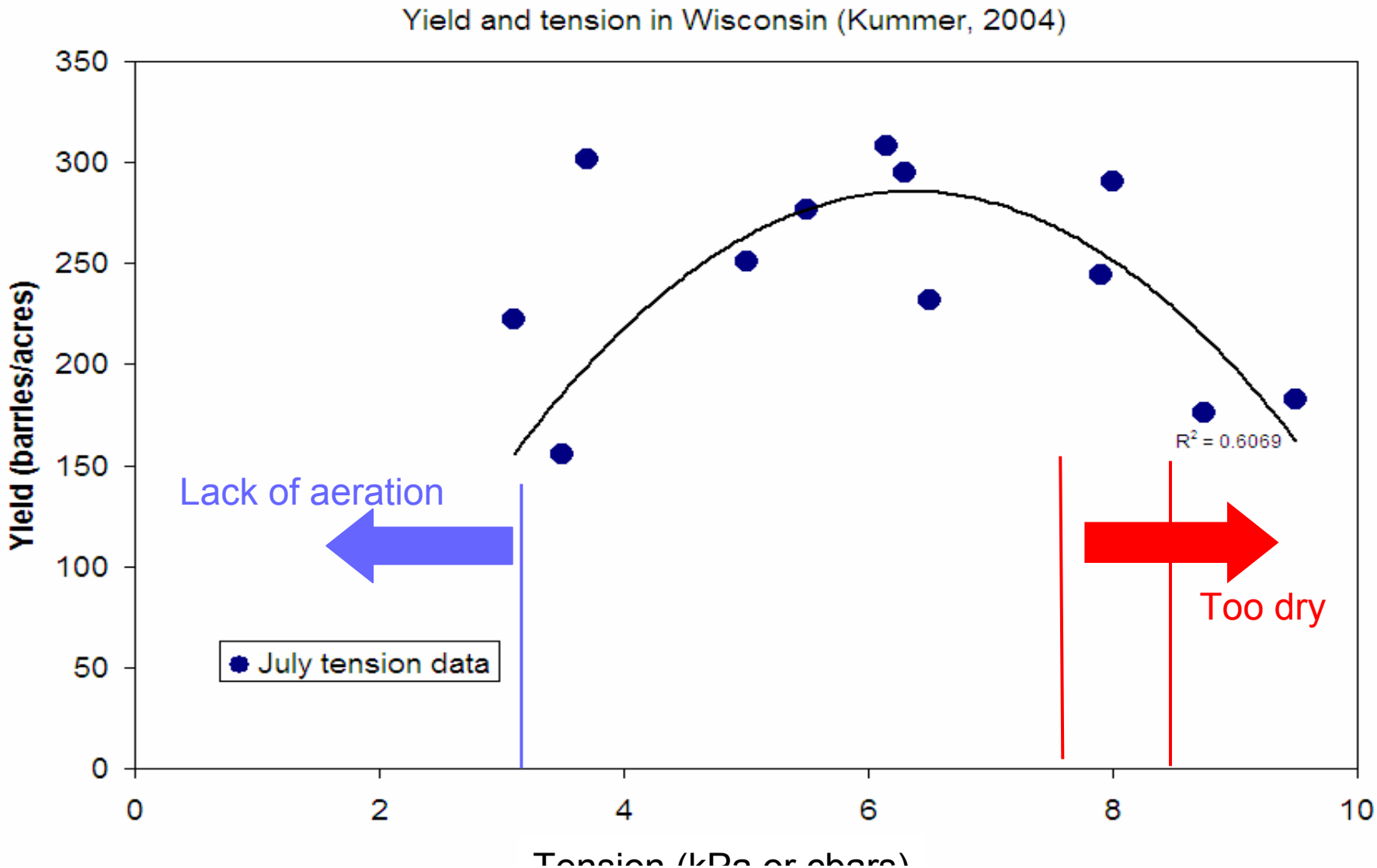
Known Tensiometer Threshold Values to initiate irrigation

Crop	Soil Type	Tension
Vegetables/Fruit in open field	Sandy & Loamy Soil	-15 to -36 kPa
Vegetables/Fruit in open field	Clay Soil	-30 to -60 kPa
Greenhouse Vegetables	Rockwool (dry type)	-1.0 to 1.5 kPa (Day) ~ -2.5 kPa (Night)
Greenhouse Vegetables	Rockwool (wet type) Sawdust; Coarse Coir	-1.5 to 2.0 kPa (Day) ~ -3.0 kPa (Night)
Greenhouse Vegetables	Peat-Based Substrates Fine Coir	-2 to -3 kPa ~ -4 kPa (Night)
Nursery	Peat/Bark Mix	-3 to -10 kPa
Potted Plants	Peat-Lite Mix	-3 to -10 kPa




Photosynthesis of fruiting shoots at different tensions
Photosynthesis (µmoles CO2 m-2 s-1)
12
10
8
6
4
2
0
R2 = 0.79
1,5 kPa
0
3
6
9
Tension (kPa or cbars)

Yield measurements

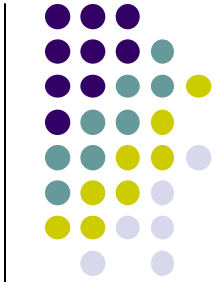


Embedded Research

Water use efficiency (WUE)

- $\Delta^{13}C$ – carbon isotope discrimination
- Correlation between $\Delta^{13}C$ with fruit yield
- Correlation between $\Delta^{13}C$ with phenolic compounds
- Stomatal conductance under different water regimes

Others areas of interest



- Fruit yield – enhancers & limiters
- Cold acclimation – proteins synthesized
- Dormancy factors – what happens
- Winter survival – perenniality

Thank you for attending